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Microwave Assisted Rapid Synthesis of Nano-Binder from Renewable Resource and Their Application in Textile Printing

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Abstract : Due to limited fossil resource and an increased need for environmentally friendly, sustainable technologies, the importance of using renewable feed stocks in textile industry area will increase in the decades to come. This research highlights some of the perspectives in this area. Alkyd resins for high characterization and reactive properties, completely based on commercially available renewable resources (sunflower and/or soybean oil) were prepared and characterized. In this work, we present results on the synthesis of various alkyd resins according to the alcoholysis – polyesterification process under different preparation conditions using a microwave synthesis as energy source to determine suitable reaction conditions. Effects of polymerization parameters, such as catalyst ratio, reaction temperature and microwave power level have been studied. The prepared binder was characterized via FT-IR, scanning electron microscope (SEM) and transmission electron microscope (TEM), in addition to acid value (AV), iodine value (IV), water absorbance, weight loss, and glass transition temperature. The prepared binder showed high performance physico-mechanical properties. TEM analysis showed that the polymer latex nanoparticle within range of 20–200 nm. The study involved the application of the prepared alkyd resins as binder for pigment printing process onto cotton fabric by using a flat screen technique and the prints were dried and thermal cured. The optimum curing conditions were determined, color strength and fastness properties of pigment printed areas to light, washing, perspiration and crocking were evaluated. The rheological properties and apparent viscosity of prepared binders were measured in addition roughness of the prints was also determined.

Keywords : nano-binder, microwave heating, renewable resource, alkyd resins, sunflower oil, soybean oil
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